QUANDELA

PRODUCT CATALOGUE 2026

Quandela designs and delivers photonic quantum technologies that are scalable, energy-efficient, and ready for real-world deployment.

Our mission is to make quantum computing accessible and useful for researchers and organizations seeking to solve complex computational challenges and accelerate innovation.

This product catalogue presents Quandela's hardware portfolio, from single-photon sources to modular quantum computing platforms, along with the technologies that enable their integration into existing infrastructures. Our solutions are built to meet the requirements of industry, research institutions, and technology leaders looking for reliable and future-proof quantum systems.

By bridging cutting-edge research with industrial-grade engineering, Quandela empowers its partners to move from experimentation to impact.

We invite you to explore our hardware solutions and discover how quantum technologies can transform your organization.

Niccolo Somaschi
Cofounder – CEO, Quandela

Driven by Quantum, Empowered by Quandela

QUANDELA
Quantum Solutions

Established in 2017 by Prof. Pascale Senellart, Niccolo Somaschi, and Valérian Giesz, Quandela designs and delivers photonic quantum technologies that bridge cutting-edge research and industrial applications. From pioneering single-photon sources to scalable quantum computing platforms, Quandela combines hardware, software, and services to make quantum technologies accessible and impactful in real-world environments.

Over the years, Quandela has developed a comprehensive portfolio of high-performance systems for the generation, manipulation, and detection of single photons, as well as modular quantum computing architectures designed for reliability, energy efficiency, and integration into existing infrastructures. These solutions support both advanced research and the emerging needs of industry.

At Quandela, we believe that photonic quantum technologies are the most promising way to build the next generation of computing. Our mission is to accelerate the transition from experimentation to deployment by building scalable, energy-efficient, and datacenter-ready quantum systems that empower organizations to address complex scientific and industrial challenges.

Pascale Senellart, Niccolo Somaschi and Valérian Giesz
Founders of Quandela

MosaiQ

The First Datacenter-Ready Quantum Computer Based on Photonic Qubits

Merlin and Perceval

Frameworks for Quantum Computing and AI

Prometheus and eDelight

All-In-One Standalone Quantum-Dot Single-Photon Source

Associated Solutions

Quantum Starter Pack
Quantum Acceleration Program
Quandela Cloud 2.0

MosaiQ

The First Datacenter-Ready Quantum Computer

Rack system

From 8 qubits to 48 qubits – all in rack systems

- Fully Modular
- Installation in 3 days
- Fully Upgradable
- Short lead-time (8 to 10 months)
- Low Energy Usage (< 5kW)

SOFTWARE PROGRAMMING FRAMEWORKS

Perceval · Eviden · Qibo · Qiskit

24-qubit and 48-qubit systems now available for order.

- Bright fiber-pigtailed quantum-dot based source
- All-included cryogenic system (air-cooled compressor pump...)
- Qubits encoded on single photons
- Qubit operations at room temperature
- All-to-all qubit connectivity
- SiN based programmable photonic circuit

TECHNICAL SPECIFICATIONS

Number of Qubits		8, 12, 24, 48
Physical circuit depth		8–48
1-qubit gate Fidelity		>99.5%
2-qubit gate Fidelity		>99%
3-qubit gate Fidelity		Typically 86%
GHZ state	State size 3–12	Fidelity typically 50–85%
Average service level agreement for hardware support		1 week
QScore		≥ 4, 6, 10, 18, depending on the system size

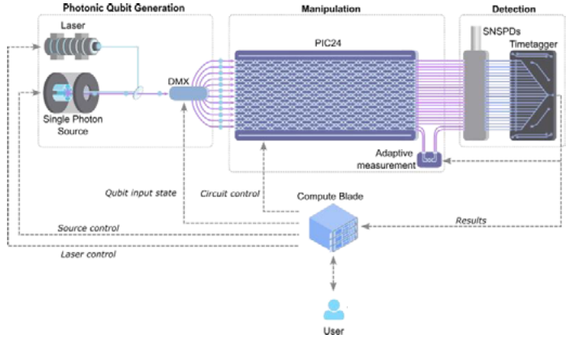


Figure 1 Schematic of MOSAIQ-12, on the general architecture of Ascella:

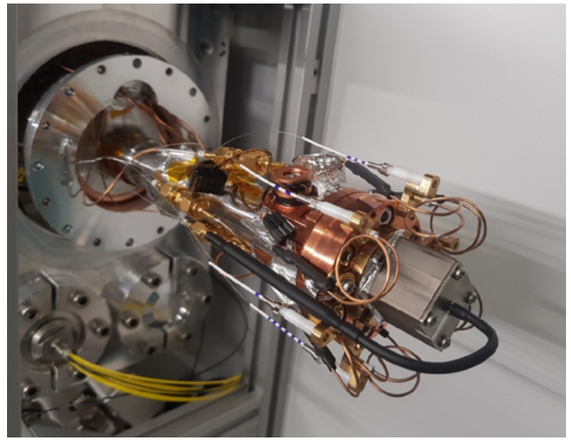
- The universal chip has 24 modes to allow the manipulation of 12 photonic qubits
- Photon detection will integrate SNSPD or PNR detectors (see photon detection below)
- An adaptative measurement module is integrated to allow feedforward implementation

Cryogenic System, Pigtail eDelight Device & SNSPDs

The eDelight (or single-photon source) device is installed in a compact cryostat. Both the cryostat chamber and the compressor are integrated in MosaiQ systems.

The cryostat is a standard which reaches 3K via a closed cycle of compression and expansion of helium gas. The air-cooled compressor is now compact and fit in a rack self. To ensure the mandatory temperature cycle after each 3 months at cryogenic temperature, the system also includes a vacuum pump.

The single-photons detectors are SNSPDs. In a MosaiQ-6 system they are all integrated in the same cryostat chamber as the eDelight device, while they are dispatched in two cryostat chambers in a MosaiQ-12. The eDelight device is cover by a shield so that the excitation laser does not saturate the single-photon detectors.



Patented Technology: Patent n° US11867957 delivered on January, 9th 2024, PCT/FR2022/050805

Opto-Electronic Systems

Laser shaping

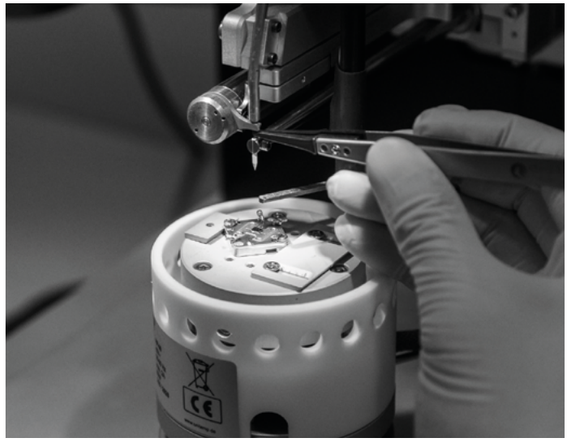
To efficiently excite the eDelight device and emit the single-photons, MosaiQ systems integrate a pulsed laser and a laser shaper. The laser parameters, such as the central wavelength or the pulse duration, are perfectly controlled and monitored by the system.

QFDMX-n module

MosaiQ systems also include an opto-electronic system which allows for both filtering out the reflected laser and efficiently collecting the emitted single photons. These systems also allow to send the stream of single-photon into n-channels. Quandela proposes up to 12 channels. The fibre delays ensure a synchronisation of the single photons from each channel.

Photonic chip with m modes

MosaiQ systems integrate a photonic chip with m modes. Directly placed after the QFDMXs and before the SNSPDs, this is the quantum processor of the QPU. Composed of waveguides, the single-photon paths are modifiable by changing phase shifters linked to local resistors. These changes depend on the implemented job/ calculation.



Software Stack

The MosaiQ system is fully automatised and is a stand alone product. A blade controls all the devices. Measurement points enable to stabilised or maximised some metrics so that the system is always optimised.

Perceval provides a hardware-native framework to model, simulate and execute photonic quantum circuits.

Designed for quantum researchers, to work directly at the circuit level.

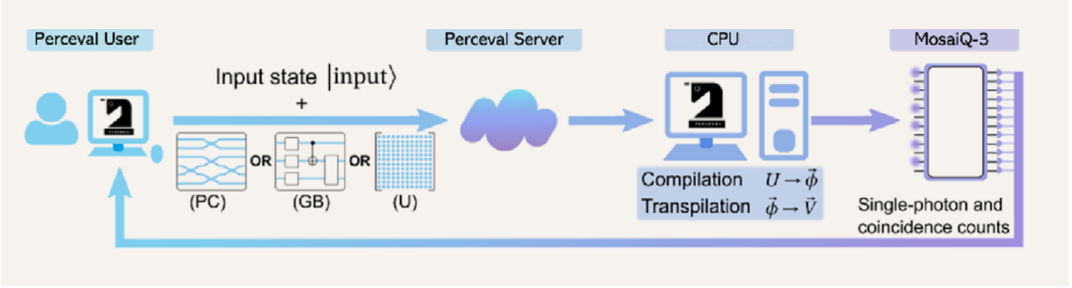
MerLin brings photonic quantum machine learning intostandard AI workflows.

The Quandela Quantum Toolbox exposes pre-packaged quantum algorithms and cloud services through language-agnostic SDKs and APIs.

Software engineers can call quantum primitives asservices from existing applications.

Tailored for data scientists who can embed quantum layers in neural networks without further quantum computing knowledge.

The user has access to the QPU via a personal version of the Quandela Cloud. Thanks to Perceval, they can implement any job compatible with their n-qubits m-modes QPU:



Access to Quandela Cloud

Build hybrid architecture and get access to high-availability QPU and GPU-accelerated simulators. Benefit from packaged quantum primitives through Quandela Quantum Toolbox.

Implement shot-based billing through different offering for small experiments up to mission-critical enterprise access.

Integrate Token-Based REST API with multi-language SDK for integration in Business applications.

Photonic quantum computing, combining hardware QPUs and classical simulators.

The platform provides job submission, backend selection, job monitoring, and result retrieval through REST APIs and Python SDKs.

Users submit quantum jobs via the Python-based Perceval front-end,selecting hardware or simulator back-ends.

Results are returned via REST / SDK interfaces, enabling integration with classical post-processing or hybrid workflows.

The integrated software stack is designed to be open, extensible, and production-ready, so users can choose their entry point according to their expertise and needs.

Register at cloud.quandela.com

MerLin

Your First Step Toward Hybrid
AI + Quantum

AI friendly

PyTorch-like interface
No quantum
expertise required
Drop-in quantum layers

Train at Scale — GPU Acceleration

GPU-accelerated
simulation
Benchmark-driven
workflows
Reproducible experiments

Deploy on Hardware — QPU ready

Native photonic primitives
QPU integration via cloud
Evolved with fault-tolerant
architecture bricks

Powerful simulation tools are essential to develop better algorithms and accelerate the path to broad quantum advantage. Merlin solves a critical ecosystem need by opening the door for the broader research community to develop with photonic quantum circuits.

Sam Stanwick
Group Product Manager for Quantum Computing
at NVIDIA

Launched in partnership with NVIDIA

merlinquantum.ai

Perceval

The Linear Optic Simulators
and QPU Connector

Connectors to Several Other Frameworks

Open-Source Python Framework

High performance Simulation Backend

Seamless Integration With Quandela SDK

Design custom algorithms	**Simulate and optimize** photonics circuits
Automatic **transpilation and hardware-aware** compilation	**Execution** on simulators and real hardware

perceval.quandela.net

Some Quantum Computing Applications

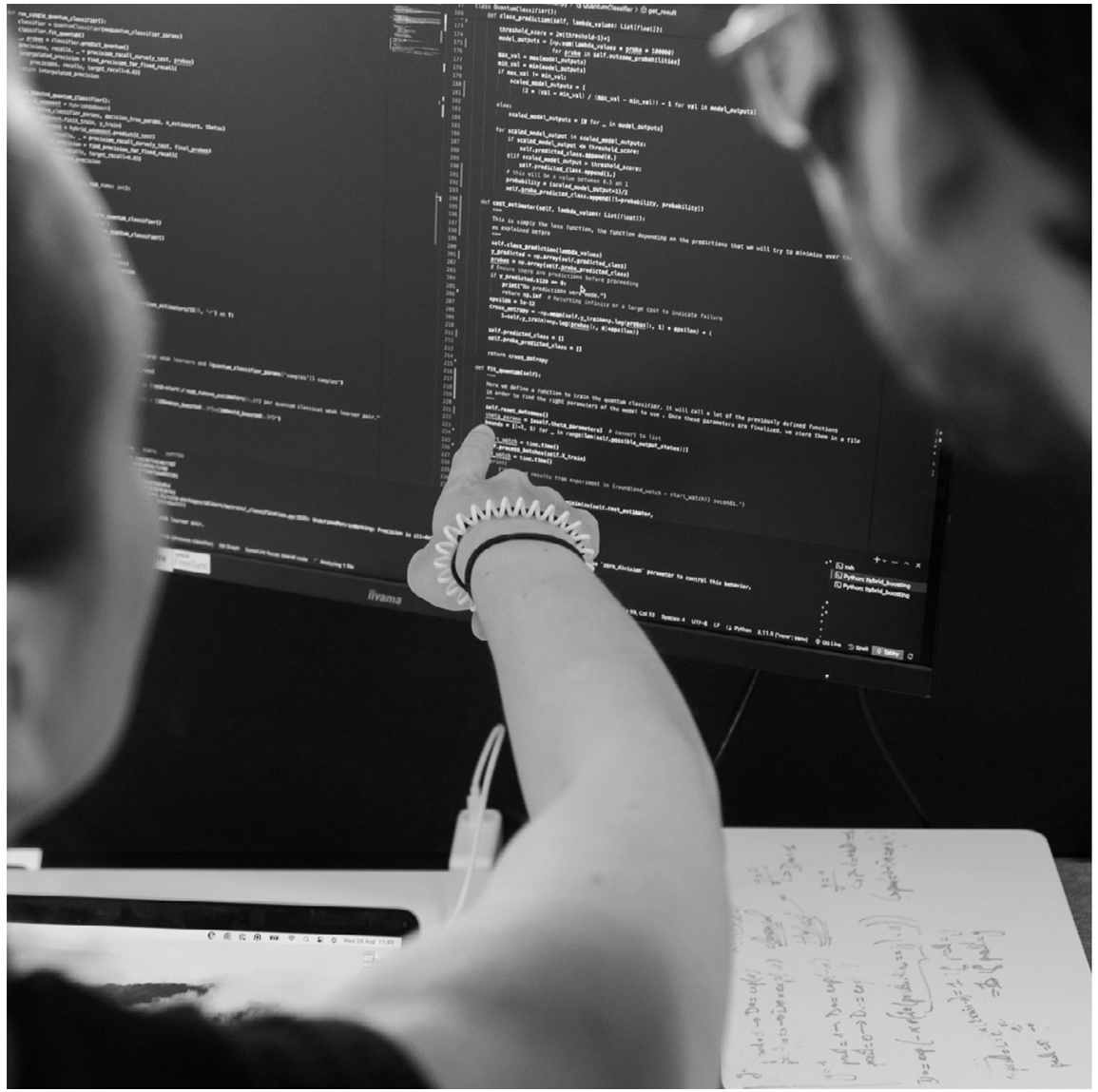
Entropy

Secure your facilities with Data-Center Ready Quantum Random Number Generators

	Entropy	Entropy++
Bell State Generation Rate	100kbps	200kbps
Verification Method	Bell Test Quantum Validation (CHSH > 2.2)	Bell Test Quantum Validation (CHSH > 2.2)
API Compatibility	Compatible with any datacenter	Compatible with any datacenter
Unit Dimensions (cm)	60x80x180	60x80x180
Weight	80kg	90kg

More Info on
www.quandela.com

Read Our
HPC White Paper:



Chemistry

MosaiQ run **Variational Quantum Eigensolver (VQE) and Quantum Machine Learning (QML)** workflows using programmable photonic circuits. In VQE, a parameterized optical circuit prepares trial molecular/material states, measurements estimate energy, and a classical optimizer updates circuit parameters to converge toward ground-state properties relevant to chemistry and materials.

For QML, the same photonic processor acts as a **trainable model:** input features (e.g., molecular descriptors or Hamiltonian terms) are encoded into photonic modes, the circuit applies a learnable transformation, and measurement outcomes drive classical training. These hybrid approaches support material simulation and chemistry use cases such as **energy estimation, property prediction, and screening** within NISQ-era resource limits.

Optimization of Logistical Problems

MosaiQ, Quandela's NISQ photonic quantum computer, tackles optimization and logistics with hybrid quantum–classical workflows. Parameterized photonic circuits run variational quantum algorithms to explore large solution spaces, while classical optimizers iteratively tune circuit settings to converge toward high-quality schedules, routes, and resource allocations.

In parallel, MosaiQ supports quantum machine learning approaches where data-driven models are encoded into photonic circuits to learn patterns and heuristics that guide decision-making—helping accelerate use cases such as routing, assignment, packing, and network optimization under real-world constraints

Prometheus

All-In-One Standalone Quantum-Dot Single-Photon Source

Optical Quantum technologies require long streams of identical single photons produced in a stable and robust manner.

The revolutionary concept and design of Prometheus' stand-alone single-photon source makes it the optimal solution for providing a high rate of single and indistinguishable photons for demanding quantum applications.

It consists of an all-in-one device that provides a stable stream of photons with a record brightness thanks to our proprietary technology.

Hence, with Prometheus, engineers and researchers can now focus their efforts on their ideas for the design of new experiments based on the manipulation of a large number of optical quantum bits.

- Modular Design
- Ease of Use
- Ready for Large-Photon Number Applications
- Performant & Reliable

- Cryostat chamber including the pigtailed single-photon source & optional SNSPD
- Air-cooled helium Compressor module & pump
- Main computer and control software
- Laser box for electronical and primary laser
- Shaping module
- Optional active demultiplexer

An Optical Laboratory in One Reliable And Vertical Device

After years of research and innovation, Prometheus is the only standalone device for the emission and the detection of single photons at record rates.

Inside Prometheus:

- A Helium closed cycle cryostat with air-cooled compressor (water cooling possible) integrating eDelight single photon sources and SNSPDs detectors (optional);
- A 80-MHz pulsed laser used for the optical excitation of the source
- Optical and electronical modules for the use of the source and detectors
- Optional Active Demultiplexer Q-DMX (from 6 to 12 outputs)
- Vacuum Turbo Pump
- Main Computer with user-friendly control software

Applications:

Use of multiple single photons at the input of programmable interferometers. Photonic Integrated Circuits can be provided.

All the modules are interconnected via optical fibers, which provides a modularity and upgradability.

Thus, the performance of the device can be upgraded, which will never be obsolete.

SPECIFICATIONS

Technology	Proprietary fabrication process and design, fully deterministic: a selected quantum dot coupled to the optical cavity mode
Single-photon emission wavelength	927 ± 5 nm
Photon polarization	All the photons have the same polarization
Minimal guaranteed fibered brightness (photon presence per pulse probability)	> 40% after filtering
Typical single-photon generation rate at an excitation clock rate of 79MHz	> 32 M photons per second
Single-photon purity :g(2)(0)	Typically 2%, < 3% guaranteed[1]
Indistinguishability	Typically 94%, > 90% guaranteed[2]
Single-photon bandwidth – emitter lifetime	1.2 ± 0.4 GHz, < 150 ± 50 ps ''Fourier-transformlimited'' emission
Output	780-HP fiber[3]
Cooling time	About 12 hours for the pumping and cooling to 4K
Dimensions (cm)	140 (h) x 100 (d) x 80 (w)
Weight	~200 kg (4-wheeled rolling system)
Required operating temperature	+15°C to +30°C, with a daily peak-to-peak fluctuation amplitude of less than 3°C Indoor use only
Required operating humidity	≤ 55 %, with a peak-to-peak fluctuation amplitude of less than 20% Indoor use only
Power	230 ± 10 V, compatible with CEE 7/3, CEE 7/4 or CEE 7/5
Consumption	< 3kW (for air-cooled compressor)
Environment	Must be isolated as much as possible from vibration Must be free from electromagnetic disruption and electrostatic discharge

1 Second order correlation measured" via Hanbury Brown-Twiss interferometer.
2 Photon indistinguishability between successively emitted photons measured by ''Hong-Ou-Mandel" interference measurements.
3 Available connectors: PF/PC, FC/APC, E-2000/PC, E-2000/PC... To be discussed with Quandela.

Please note that these specifications are subject to change without any prior notice.

eDelight

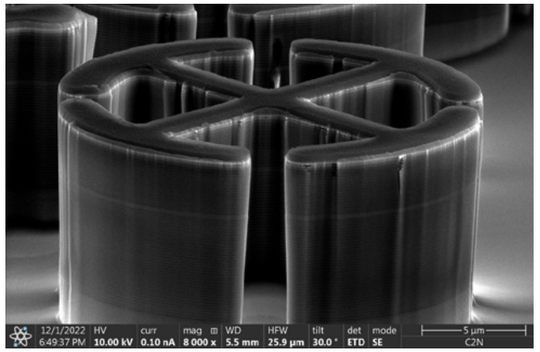
Photonic Qubit Generator
Efficient and Deterministic

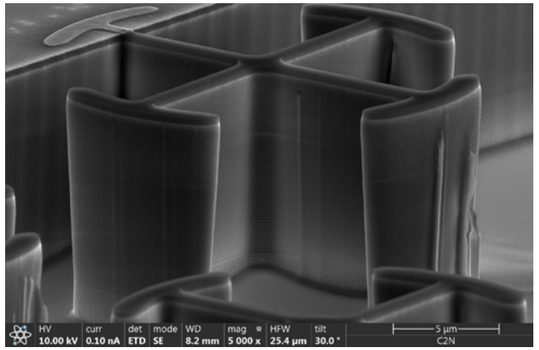
About Semiconductor Quantum Dots

eDelight utilizes semiconductor InAs Quantum dots as its primary sourcing elements, demonstrating near-ideal quantum emitter behavior. The precision and efficacy of our quantum dot system are enhanced through a deterministic coupling mechanism, where selected quantum dots are deterministically coupled with an optical cavity in the form of a micropillar.

The micropillar's structure is crafted from doped semiconductors, enabling the application of a DC-voltage for fine-tuning the quantum dot transition. This meticulous adjustment results in a precise spectral matching of the emitted photon, achieved by orchestrating the recombination of charges within the quantum dot with the optical mode of the cavity. The integration of these advanced technologies ensures optimal control over individual quantum dots and enhances the collection of emitted photons, establishing eDelight as a pioneering solution in quantum emitter technology.

- High Brightness With Low Multiple Photon Emission and High Photon Indistinguishability
- Efficient and Deterministic Generation of Pure Single Photons





Associated Solutions:

Quantum Starter Pack

A 8-Qubit Photonic Platform Designed for Quantum Learning, Research And Discovery.

Plug and play

Delivered as a fully integrated rack system, operational within few months. Designed for standard laboratory environments and production centers. Consumes less than 3 kW. Ready for modular extension.

Open-Source Frameworks

Directly operates with Perceval, Quandela's open-source quantum framework. Fully compatible with standards such as Qiskit and Qibo. Offers low-level API access for complete control of photonic circuits.

Quandela Hub

Train and connect your teams with the Quandela Hub — the global center for photonic quantum learning and collaboration.

Processors	**8 Qubits**
Single-qubit gate fidelity (T-gate)	>99.5%
Two-qubit gate fidelity (CNOT)	>99%
Three-qubit gate fidelity (Toffoli gate)	Typically 86%
Heralded GHZ fidelity	82.0 ± 0.4%
Q-score	6
QOPS[1]	200+
Power consumption	3 kW
Operating temperature	room temperature
Industry-leading photonic source performance:	over 50% First Lens Brightness

1 Quantum Operations Per Second

Quantum Acceleration Program

Empowering Organizations to Adopt, Explore, and Gain Value From Photonic Quantum Technologies.

Quantum Algorithm Development

Design and test quantum algorithms tailored to your use cases, transforming theoretical potential into tangible research or business results.

Direct Hardware Access

Validate and optimize algorithms on real quantum processors, bridging simulation and experiment for accelerated learning.

Access to Quantum Experts

Collaborate with Quandela experts to accelerate understanding and build lasting in-house quantum capabilities.

Collaborative, Hands-On Projects

Each project combines collaboration, training, and experimentation. Through shared work, teams gain practical experience, advance their quantum readiness, and build sustainable in-house expertise.

1	**QUANTUM DISCOVERY**	Training & Orientation	Use-case Identification	Hands-on Toy Problem
2	**QUANTUM EXPLORATION**	Proof of Concept Development	Large Scale Simulation & Benchmarking	Preliminary Resource Estimation
3	**QUANTUM VALUE**	Hardware Mapping & Optimisation	Resource Estimation	Return on Investment Analysis

Quandela Cloud 2.0

Fulfill Your Quantum Ambitions With a Cutting-Edge Platform Tailored to Your Needs

Quandela Cloud is a comprehensive platform to discover, learn, test, and develop quantum solutions. It gives access to the most advanced quantum servers available at Quandela, easy to use software for generating and manipulating quantum circuits, as well as middleware for executing hybrid quantum-classical workflows in heterogeneous computing environments.

Register for Free:
cloud.quandela.com

Available Quantum Computers on Quandela Cloud

Since 2022
Ascella 6 photons
/ 12 modes

Since 2025
Belenos 12 photons
/ 24 modes

Mid-2026
Canopus 24 photons
/ 48 modes

Exqalibur – GPU-enhanced emulation:
Introducing a new emulator for photonic qubits that leverages the capabilities of the most powerful GPU and enables computations at an unprecedented scale. With this advancement, users can now explore up to 150 billion parameter spaces across 20 photonic qubits at kilohertz rates, facilitating faster prototyping and optimization of quantum algorithms.

Exclusive QPU reservation service:
In addition to standard on-demand access, the new system offers premium users an intuitive reservation platform to secure QPU time on designated dates and times. This tailored reservation model enhances the user experience by facilitating seamless coordination among development teams.

Flexible pricing options for small experiments up to mission-critical enterprise access

Built-in Error Mitigations:

Two powerful patented error mitigation techniques have been introduced for the control of Altair, allowing us to push further the fidelity and quantum gates speed:

AI-Driven Quantum Fidelity Enhancement:
This technique harnesses the power of machine learning's 'clear-box' methodology to significantly mitigate hardware imperfections. This innovative approach boosts qubit fidelity by several percentage points, ensuring even greater reliability and performance in quantum computing applications. Further details are provided below.

Photon Recycling:
This unprecedented technique exploits lossy output photon states to consolidate statistics of non-lossy states, allowing for a more precise estimation of the probability distribution with fewer numbers of shots.

QUANTUM TOOLBOX

This comprehensive suite includes pre-optimized primitives tailored for specific applications such as Variational Quantum Eigensolver (VQE) and graph analysis.

It expedites the time to production of quantum algorithms for industry-specific use cases, by providing a native optimization of these algorithms with Quandela QPUs and selected GPUs.

Backed by the expertise of Quandela's application team, users will receive direct support to maximize the utility and efficacy of these tools.

VQE chemistry
VQE to compute ground state of molecules on QPU BeH, LiH, H2O, H2 on QPU

VQE custom
$H = \Sigma h_\alpha P_\alpha$
To compute ground state of user-chosen Hamiltonian

CVar-VQE
VQE variant to solve combinatorial optimization problems

Graph Isomorphism
Boson salmpling based algorithm to check whether two graphs are isomorphic

Dense Subgraph Identification
Boson sampling based algorithm to identify dense subgraphs

Visit our Training Center:
training.quandela.com

RELEVANT SCIENTIFIC PUBLICATIONS:

Quantum-dot-based single photon Sources	N. Somaschi et al. 'Near-optimal single-photon sources in the solid state', Nature Photonics 10, 340 (2016)	P. Senellart et al., High-Performance Semiconductor Quantum-Dot Single-Photon Sources, Nature Nanotechnology 12 (2017)	S. Thomas et al. 'Bright Polarized Single-Photon Source Based on a Linear Dipole' Phys. Rev. Lett. 126, 233601 (2021)
Photonic cluster state generation	S. Wein et al. Photon-number entanglement generated by sequential excitation of a two-level atom, Nature Photonics 16, 374 (2022)	N. Coste et al. High-rate entanglement between a semiconductor spin and indistinguishable photons, Nature Photonics 17, 582-587 (2023)	
Compatibility and interfacing with an active demultiplexer and other modules for quantum computing applications	Anton et al., 'Interfacing scalable photonic platforms: solid-state based multi-photon interference in a reconfigurable glass chip', Optica6 (2019) M. Pont et al. 'High-fidelity generation of four-photon GHZ states on-chip', arXiv:2211.15626 (2022)	D. Istrati et al. 'Sequential generation of linear cluster states from a single photon emitter', Nature Comm. 11, 5501 (2020)	M. Pont et al. Quantifying n-Photon Indistinguishability with a Cyclic Integrated Interferometer, Phys Rev X12.031033 (2022)
Single-photon based quantum computing	N. Maring et al. A General-Purpose single-photon based Quantum Computing Platform, arXiv:2306,00874 (2023) – Accepted for publication in Nature Photonics Soret et al., Quantum Energetic Advantage before Computational Advantage in Boson Sampling, arxiv:2601.08068 (2026)	N. Maring et al. A General-Purpose single-photon based Quantum Computing Platform, Nature Photonics (2023)	N. Heurtel et al. Perceval: A Software Platform for Discrete Variable Photonic Quantum Computing, Quantum 7, 931 (2023)
Quantum Applications	Sedrakyan et al., Photonic Quantum Generative Adversarial Networks for classical data, Optica Quantum (2024) Remond et al., Quantum Remeshing and efficient encoding for fracture mechanics arxiv:2510.14746 (2025)	Fyrillas et al., Certified Randomness in tight space PRX Quantum (2024)	Notton et al., Establishing Baselines for Photonic Quantum Machine Learning : Insights from an Open, Collaborative Initiative – arXiv 2510.25839 (2025)

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